Original Title:

Boot Record & Partition Recovery

Speaker: David Simmons, P.E.
February 19, 2011

~ Raising the Dead ~

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The Scenario

Perceived 'dead' laptop

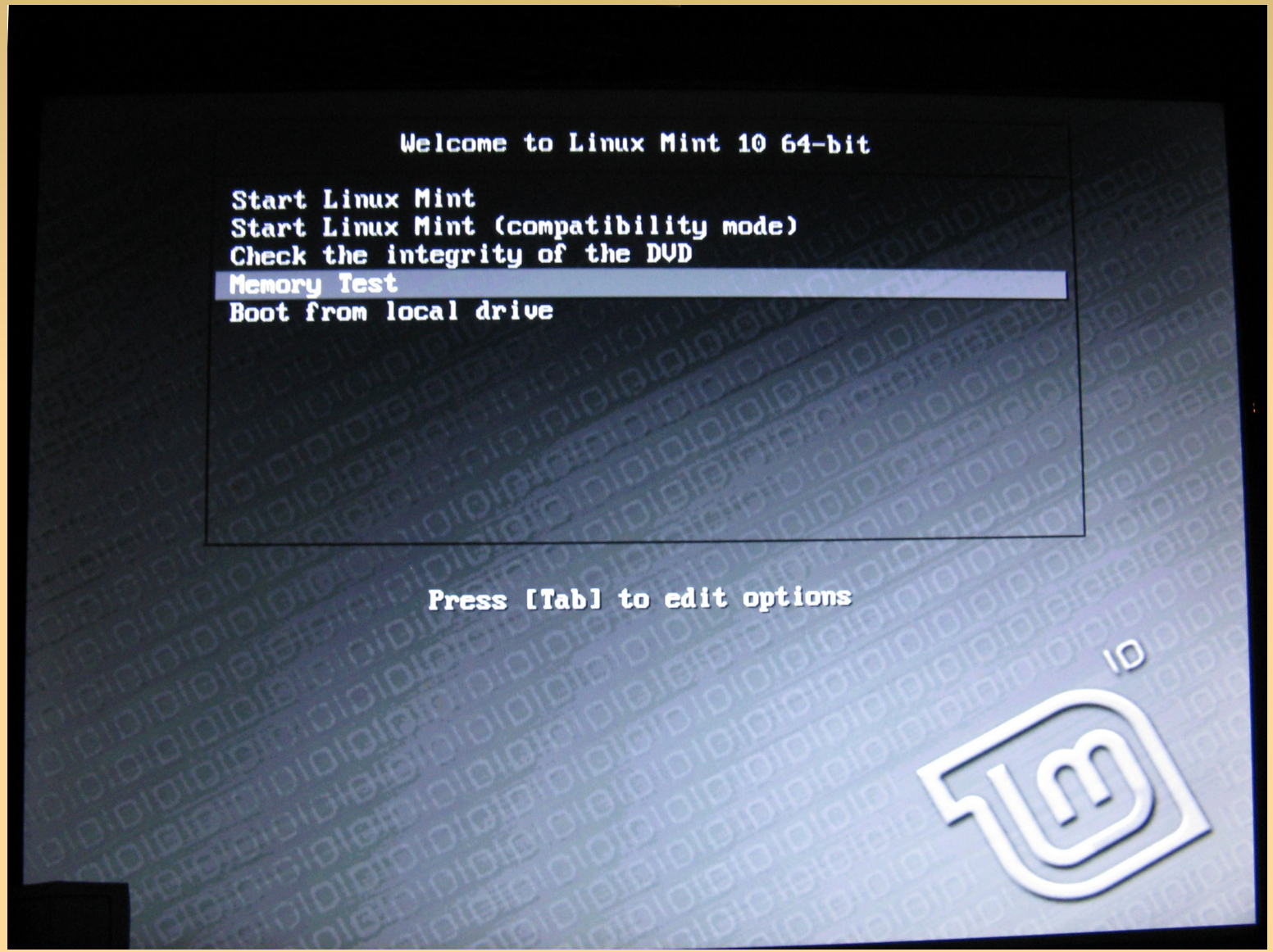
- only problem was
  dead/dying
  hard-drive

** hard-drive contained OS restore partition **

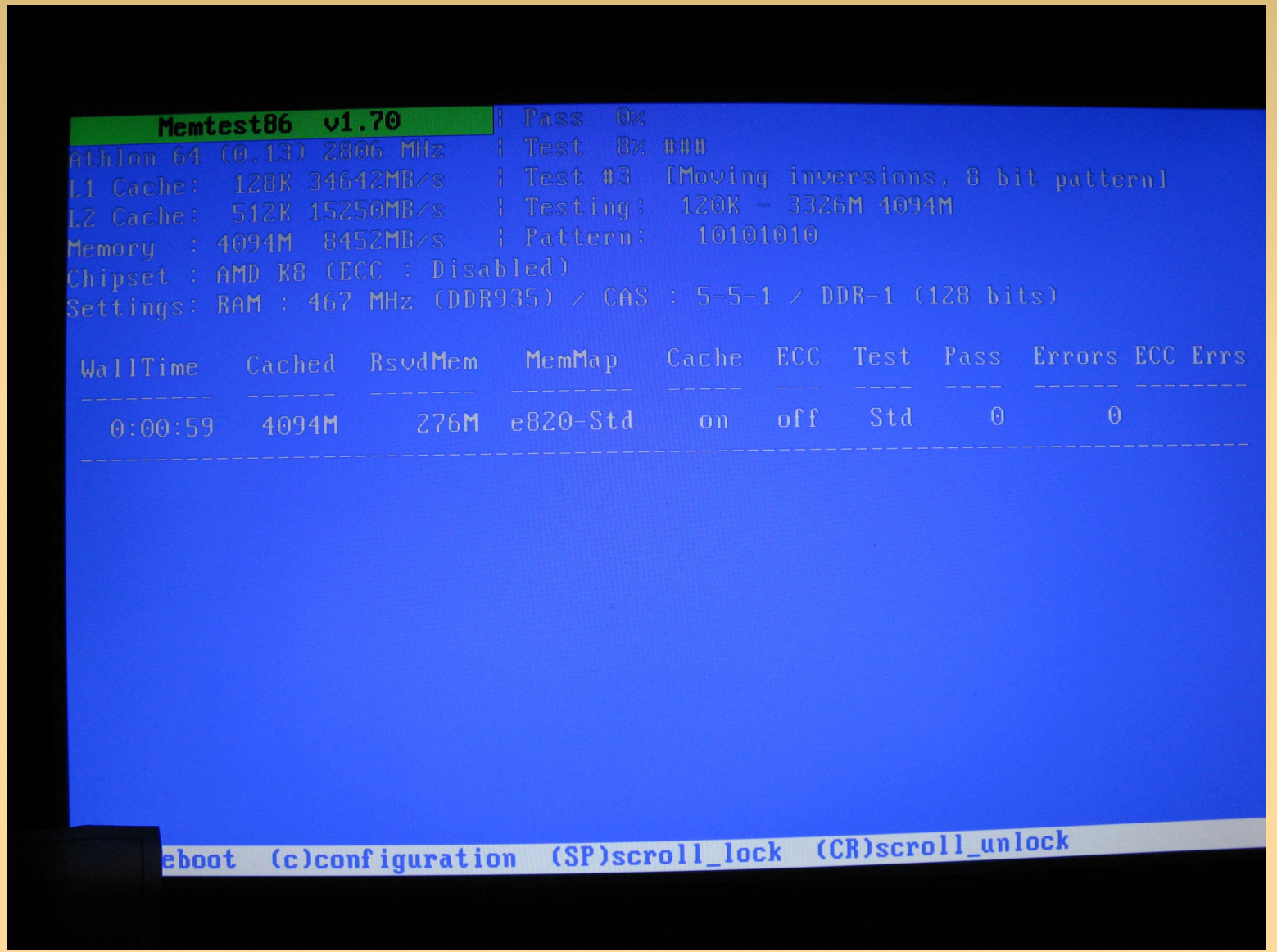
So...why do this?

- Except for the cost of new hard-drive & elbow grease, it's a free way to obtain a 'new' laptop
- ** Original OS restore has all of the laptop drivers / setup / license keys / etc built in **
- Doesn't matter if base OS is virus-ridden
- Become a hero to someone who really needs help

Something to do first - Memtest



Something to do first - Memtest



Tools Needed

Small screwdrivers

'Surrogate Mother' Linux Workstation

USB to IDE / SATA Converter

Linux LiveCD (memory / hardware test)
[website => livecdlist.com]

The Procedure - Step-by-Step

- Remove old drive
- connect to 'surrogate' mother computer
- copy master-boot and/or partition table
- copy restore partition
- connect new hard-drive
- write master-boot and/or partition table
- fdisk AND write
- dd back restore
- put new HD into laptop
- re-install via BIOS restore

Remove Old Hard-drive

Remove Old Hard-drive

Remove Old Hard-drive

Connect to 'surrogate' mother computer

Copy master-boot and/or partition table

dsimmons@daves-LinuxMint10 ~ $ **dmesg**

```
…..............................
[  871.980620] Initializing USB Mass Storage driver...
[  871.980934] scsi10 : usb-storage 1-6:1.0
[  871.981222] usbcore: registered new interface driver usb-storage
[  871.981228] USB Mass Storage support registered.
[  872.984891] scsi 10:0:0:0: Direct-Access     ST98823A         5PK0V8J4      PQ: 0 ANSI: 2 CCS
[  872.985942] sd 10:0:0:0: Attached scsi generic sg5 type 0
[  872.986742] sd 10:0:0:0: [sdd] 156301488 512-byte logical blocks: (80.0 GB/74.5 GiB)
[  872.988622] sd 10:0:0:0: [sdd] Write Protect is off
[  872.988632] sd 10:0:0:0: [sdd] Mode Sense: 00 38 00 00
[  872.988638] sd 10:0:0:0: [sdd] Assuming drive cache: write through
[  872.991110] sd 10:0:0:0: [sdd] Assuming drive cache: write through
[  872.991124]  sdd: sdd1 sdd2 sdd3
[  873.011123] sd 10:0:0:0: [sdd] Assuming drive cache: write through
[  873.011134] sd 10:0:0:0: [sdd] Attached SCSI disk
```

Copy master-boot and/or partition table

```
dsimmons@daves-LinuxMint10 ~ $ sudo fdisk /dev/sdd

WARNING: DOS-compatible mode is deprecated. It's strongly recommended to
        switch off the mode (command 'c') and change display units to
        sectors (command 'u').

Command (m for help): p

Disk /dev/sdd: 80.0 GB, 80026361856 bytes
255 heads, 63 sectors/track, 9729 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x16351635

   Device Boot      Start         End      Blocks   Id  System
/dev/sdd1   *           1        7935    63737856    7   HPFS/NTFS
/dev/sdd2            7937        9598    13350015    c   W95 FAT32 (LBA)
/dev/sdd3            9599        9729     1052257+  d7   Unknown

Command (m for help): q
```

Copy master-boot and/or partition table

The Master Boot Record (MBR) of the hard-drive is it's 'Table of Contents'
- where to find Boot & in what order
- also contains the partition table

For the new disk to boot, we must copy the boot code from the Master Boot Record (MBR) to the new disk.

The MBR is on the first sector of the disk, and is split into three parts:

Boot Code (446 bytes)
Partition Table (64 bytes)
Boot Code Signature = 55aa (2 bytes)

Only Copy the boot code
dsimmons@LinuxMint10 ~ $ **sudo dd if=/dev/sdd of=./master_boot_record bs=446 count=1**

Copy the boot code AND partition table
dsimmons@LinuxMint10 ~ $ **sudo dd if=/dev/sdd of=./master_boot_record bs=512 count=1**

Result on screen:
1+0 records in
1+0 records out
512 bytes (512 B) copied, 0.00133906 s, 382 kB/s

Copy restore partitions

In this case – two partitions are needed:

dsimmons@LinuxMint10 ~ $ **sudo dd if=/dev/sdd2 of=./was_sdd2.img**

2104515+0 records in
2104515+0 records out
1077511680 bytes (1.1 GB) copied, 40.8676 s, 26.4 MB/s

Do the same with the old sdd3 partition – so that we have captured three files:

master_boot_record
was_sdd2.img
was_sdd3.img

** *Connect New Hard-drive - but be sure to 'unmount' old hard-drive first* **

Restore MBR to new drive

```
dsimmons@daves-LinuxMint10 ~ $ sudo fdisk /dev/sdd
[sudo] password for dsimmons:
Device contains neither a valid DOS partition table, nor Sun, SGI or OSF disklabel
Building a new DOS disklabel with disk identifier 0xe6c0a0e0.
Changes will remain in memory only, until you decide to write them.
After that, of course, the previous content won't be recoverable.

Warning: invalid flag 0x0000 of partition table 4 will be corrected by w(rite)

WARNING: DOS-compatible mode is deprecated. It's strongly recommended to
        switch off the mode (command 'c') and change display units to
        sectors (command 'u').

Command (m for help): p

Disk /dev/sdd: 80.0 GB, 80026361856 bytes
255 heads, 63 sectors/track, 9729 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
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I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0xe6c0a0e0

   Device Boot      Start         End      Blocks   Id  System

Command (m for help): q
```

Restore MBR to new drive

dsimmons@daves-LinuxMint10 ~/Bethanys_Disk $ **sudo dd if=./master_boot_record of=/dev/sdd bs=512 count=1**
1+0 records in
1+0 records out
512 bytes (512 B) copied, 0.00133906 s, 382 kB/s

dsimmons@daves-LinuxMint10 ~/Bethanys_Disk $ **sudo fdisk /dev/sdd**

WARNING: DOS-compatible mode is deprecated. It's strongly recommended to
switch off the mode (command 'c') and change display units to
sectors (command 'u').

Command (m for help): **p**

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Units = cylinders of 16065 * 512 = 8225280 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
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Disk identifier: 0x16351635

Device	Boot	Start	End	Blocks	Id	System
/dev/sdd1	*	1	7935	63737856	7	HPFS/NTFS
/dev/sdd2		7937	9598	13350015	c	W95 FAT32 (LBA)
/dev/sdd3		9599	9729	1052257+	d7	Unknown

Command (m for help): **q**

Copy old restore partitions..but!

dsimmons@daves-LinuxMint10 ~/Bethanys_Disk $ **sudo dd if=./was_sdd3.img of=/dev/sdd3**
dd: writing to `/dev/sdd3': No space left on device
1+0 records in
0+0 records out
0 bytes (0 B) copied, 0.000508487 s, 0.0 kB/s

Copy old restore partitions..but!

dsimmons@daves-LinuxMint10 ~/Bethanys_Disk $ **sudo dd if=./was_sdd3.img of=/dev/sdd3**
dd: writing to `/dev/sdd3': No space left on device
1+0 records in
0+0 records out
0 bytes (0 B) copied, 0.000508487 s, 0.0 kB/s

dsimmons@daves-LinuxMint10 ~/Bethanys_Disk # **fdisk /dev/sdd**
Command (m for help): **w**
The partition table has been altered!
Calling ioctl() to re-read partition table.
Syncing disks.
Command (m for help): **q**

Copy old restore partitions..but!

dsimmons@daves-LinuxMint10 ~/Bethanys_Disk $ **sudo dd if=./was_sdd3.img of=/dev/sdd3**
dd: writing to `/dev/sdd3': No space left on device
1+0 records in
0+0 records out
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dsimmons@daves-LinuxMint10 ~/Bethanys_Disk # **fdisk /dev/sdd**
Command (m for help): **w**
The partition table has been altered!
Calling ioctl() to re-read partition table.
Syncing disks.
Command (m for help): **q**

dsimmons@daves-LinuxMint10 ~/Bethanys_Disk # **sudo dd if=./was_sdd3.img of=/dev/sdd3**
2104515+0 records in
2104515+0 records out
1077511680 bytes (1.1 GB) copied, 40.8676 s, 26.4 MB/s

How to see write progess?

Open a new terminal window and issue the following command:

dsimmons@daves-LinuxMint10 ~ $ **sudo pkill -SIGUSR1 ^dd$**

What you'll see in the original, 'dd' command window:

163849+0 records in
163849+0 records out
83890688 bytes (84 MB) copied, 46.7219 s, 1.8 MB/s

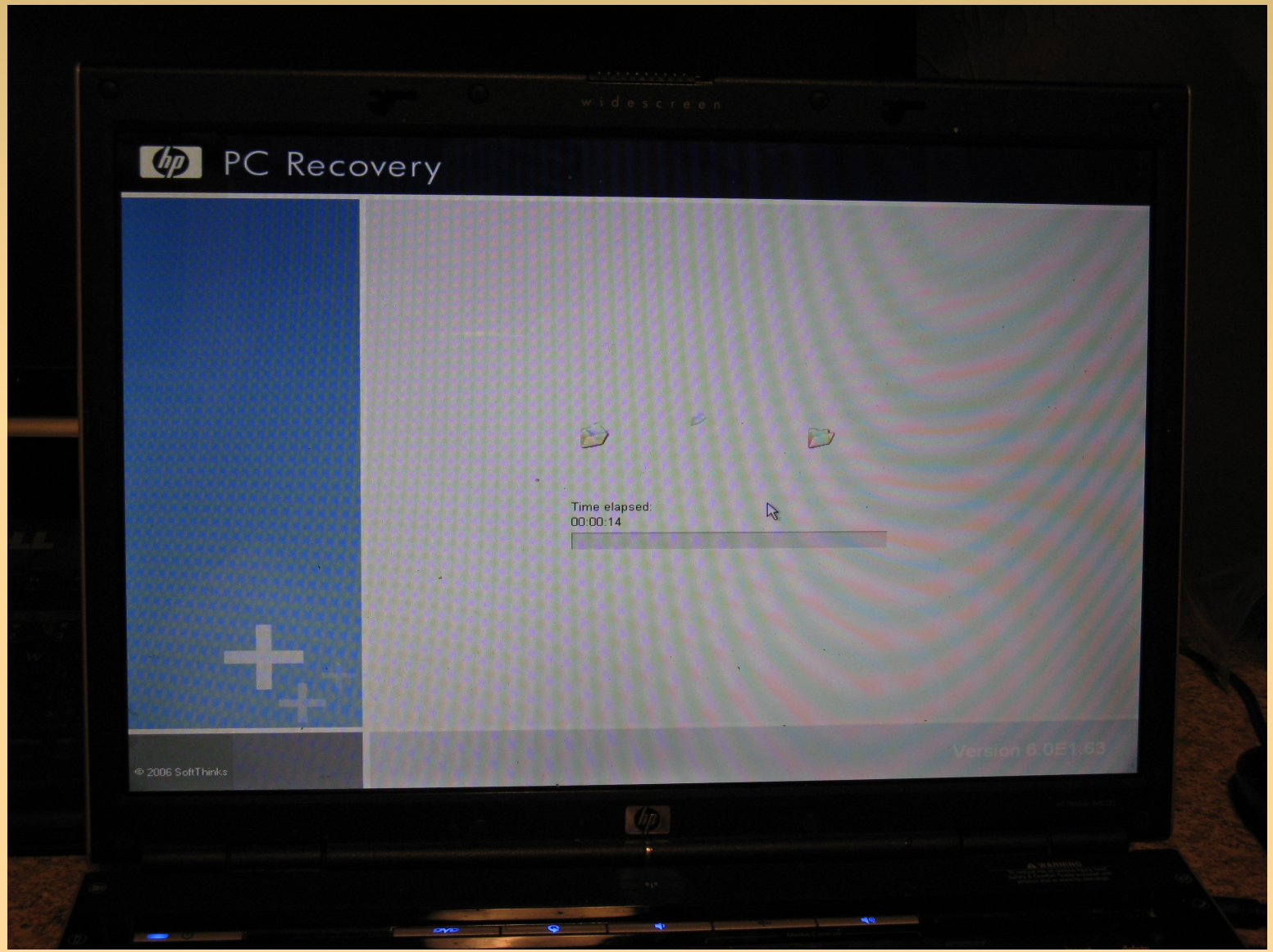
233925+0 records in
233925+0 records out
119769600 bytes (120 MB) copied, 64.5306 s, 1.9 MB/s

263363+0 records in
263363+0 records out

134841856 bytes (135 MB) copied, 74.5834 s, 1.8 MB/s
885995+0 records in
885995+0 records out

453629440 bytes (454 MB) copied, 251.554 s, 1.8 MB/s
2238447+0 records in
2238447+0 records out

Restore Original OS



Info source & additional info

http://www.nilbus.com/linux/disk-copy.php